

Amendment and Response

Applicant: Cory Watkins et al.

Serial No.: 10/073,426

Filed: February 11, 2002

Docket No.: A126.143.101

Title: CONFOCAL 3D INSPECTION SYSTEM AND PROCESS

REMARKS

The following remarks are made in response to the Non-Final Office Action mailed November 23, 2004. In that Office Action, the Examiner rejected claims 1, 2, 8, 9, 16, 20, and 21 under 35 U.S.C. §102(b) as being anticipated by Kerstens et al., U.S. Patent No. 5,248,876 ("Kerstens"). Claims 3-7, 10-15, and 17-19 were rejected under 35 U.S.C. §103(a) as being unpatentable over Kerstens in view of McCarthy et al., U.S. Patent No. 4,802,748 ("McCarthy").

With this Response, claim 1 has been amended. Claims 1-21 remain pending in the application and are presented for reconsideration and allowance.

35 U.S.C. §102 Rejections

Independent claim 1 was rejected as being anticipated by Kerstens. Kerstens describes a confocal imaging system having an enlarged mask 104 through which light from an illuminator 100 is directed. The mask 104 can form a pattern of apertures 102 (as shown in FIGS. 2 and 3) or a pattern of slits 200 (as illustrated in FIG. 6). Regardless, the array of apertures or pattern of slits are formed such that surface height determinations are made based upon a single pass of the object 112 relative to the illuminator 100 via the stage 120. For example, in the embodiment of FIG. 1, the stage 120 is moved in an inclined fashion relative to the mask 104 (indicated by the arrow 122), with the multiple aperture arrays and/or pattern slits providing correlation data for determining height. Alternatively, in the embodiment of FIG. 11, the stage 120 is moved in a parallel fashion relative to a plane of the mask 300; however, the mask 300 has a stepped configuration, thereby duplicating the effects achieved with the system of FIG. 1. Regardless, the mask associated with Kerstens is relatively large so as to achieve the specific object declared by Kerstens of obtaining a complete image with one linear scan motion. (Kerstens, Abstract; column 2, lines 48-51). In contrast, the inspection device of amended claim 1 is adapted to determine projection heights based upon light intensities identified during a plurality of repeated passes of the substrate relative to the light source or vice-versa. Kerstens does not teach or suggest at least this limitation. In fact, Kerstens teaches away from the limitations of amended claim 1. As such, the rejection of claim 1 should be withdrawn.

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Independent claim 8 relates to an inspection device including a light source and a white light confocal sensor. While Kerstens purports to describe a confocal sensor useful with light (and in particular colored light with the embodiment of FIG. 15), X-rays, and infra-red (Kerstens, column 4, line 30), white light, and thus a white light confocal sensor, is not disclosed. Thus, it is respectfully submitted that the rejection of independent claim 8 as being anticipated by Kerstens has been traversed.

Independent claim 16 relates to an inspection device adapted to rapidly determine projection heights based upon light intensities identified during a plurality of passes of light from the light source at differing optical elevations of the light source relative to the substrate. As previously described, Kerstens is limited to a single pass device. Pointedly, the stage 120 of Kerstens is described as moving only in the direction shown in FIGS. 1 (arrow 122) or 11 (arrow 302) and that there are no other moving parts. (Kerstens, column 12, lines 47-50). Thus, the Kerstens device is incapable of performing a plurality of passes at differing optical elevations of a light source relative to the substrate, let alone determining projection heights based upon light intensities identified during these plurality of passes. As such, it is respectfully submitted that claim 16 is not taught or suggested by Kerstens.

In light of the above, it is respectfully submitted that the rejections under 35 U.S.C. §102(b) of claims 1, 2, 8, 9, 16, 20, and 21 have been traversed.

35 U.S.C. §103 Rejections

Claims 3-7 depend from amended claim 1; claims 10-15 depend from claim 8; and claims 17-19 depend from claim 16. As previously described, the rejections of claims 1, 8, and 16 have been traversed. Thus, claims 3-7, 10-15, and 17-19 are similarly allowable. In addition, with respect to claims 3, 4, 10, 11, 14, and 17, it is respectfully submitted that a requisite suggestion to modify Kerstens in view of McCarthy such that Kerstens incorporates a pellicle beamsplitter does not exist. In fact, Kerstens teaches away from the use of a pellicle beamsplitter. For example, at column 12, lines 51-54, Kerstens specifically teaches the advantages of cementing pin hole mask 516, 518 and sensor array 540, 542 to beamsplitter cube 520, 522 to form an assembly for maintaining alignment. A similar configuration is taught at column 9, lines 39-45

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of Kerstens; column 10, lines 34-45 of Kerstens; and column 15, lines 49-62 of Kerstens. Kerstens describes that this configuration is preferable, as an assembly that is “very rigid and insensitive to temperature changes and mechanical disturbances” results from this cemented configuration. Thus, Kerstens teaches away from the use of a pellicle beamsplitter in lieu of the preferred cemented configuration utilizing the beamsplitter cube as disclosed, as one having ordinary skill in the art would understand a pellicle beamsplitter would not serve as a rigid structure. Indeed, in McCarthy, at column 3, lines 43-45, it is noted “the beamsplitting pellicle is extremely thin...”. Therefore, as it is improper to combine references when they teach away from a combination, one having ordinary skill in the art would not be motivated to modify the device of Kerstens to include the pellicle beamsplitter of McCarthy. For at least this additional reason, then, claims 3, 4, 10, 11, 14, and 17 recite additionally allowable subject matter.

CONCLUSION

In view of the above, Applicant respectfully submits that pending claims 1-21 are in form for allowance and are not taught or suggested by the cited references. Therefore, reconsideration and withdrawal of the rejections and allowance of claims 1-21 is respectfully requested.

No fees are required under 37 C.F.R. 1.16(b)(c). However, if such fees are required, the Patent Office is hereby authorized to charge Deposit Account No. 50-0471.

The Examiner is invited to contact the Applicant’s representative at the below-listed telephone numbers to facilitate prosecution of this application.

Any inquiry regarding this Amendment and Response should be directed Timothy A. Czaja at Telephone No. (612) 573-2004, Facsimile No. (612) 573-2005. In addition, all correspondence should continue to be directed to the following address:

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Respectfully submitted,

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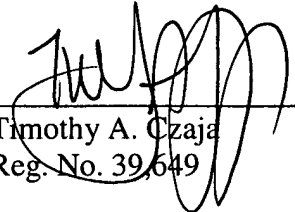
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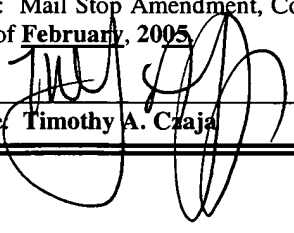
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CERTIFICATE UNDER 37 C.F.R. 1.8:

The undersigned hereby certifies that this paper or papers, as described herein, are being deposited in the United States Postal Service, as first class mail, in an envelope address to: Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on this 23rd day of February, 2005.

By 

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